REMARKS

This Response is submitted in response to the Office Action dated July 20, 2007. The Office Action objected to the Oath/Declaration; objected to claim 30; rejected claims 16-19, 21-26 and 28-29 under 35 U.S.C. §102(b); and rejected claims 20 and 27 under 35 U.S.C. §103(a). Claim 30 is amended herein. Applicants respectfully submit that the rejections and objections are improper or have been overcome, as set forth in detail below. A Petition for a One Month Extension of Time is submitted herewith. The Commissioner is hereby authorized to charge deposit account 02-1818 for the one month extension fee.

At the outsct, the Office Action objected the Oath/Declaration because the joint invcntor did not sign. In response, Applicants are submitting herewith a Declaration that was signed by the second inventor Nozomu Mitsuyoshi on February 19, 2005. Accordingly, Applicants respectfully submit that the objection has been overcome.

The Office Action objected to claim 30 because claim 30 depends from claim 13, which is a cancelled claim. In response, Applicants have amended claim 30 to properly depend from independent claim 28. Accordingly, Applicants respectfully submit that the objection has been overcome and request the withdrawal of same.

The Office Action rejected claims 16-19, 21-26 and 28-29 under 35 U.S.C. §102(b) and being anticipated by U.S. Patent No. 5,872,453 to Shimoyama et al. ("Shimoyama"). The Office Action also rejected claims 20 and 27 under 35 U.S.C. §103(a) as being obvious in view of Shimoyama. Applicants respectfully disagree with and traverse these rejections for at least the reasons below. Of the rejected claims, claims 16, 24, 26 and 28 are the sole independent claims.

Independent claim 16 recites, at least in part a battery remaining capacity calculating method for calculating a remaining capacity as a capacity of electricity dischargeable by a secondary battery. The method includes: measuring an output voltage value of said secondary battery; *dividing a use mode* of said secondary battery into a *high consumption mode* in which the *output voltage value* is not lower than a threshold value and a *low consumption mode* in which the *output voltage value* is lower than the threshold value; calculating a remaining capacity in said low consumption mode on a basis of a predetermined reference voltage curve as a discharge characteristic of said secondary battery and said output voltage value; and calculating

a remaining capacity in said high consumption mode *supposing that there is minimal change in the remaining capacity at a time of change from said low consumption mode to said high consumption mode.*

Independent claim 24 recites, at least in part a battery remaining capacity calculating device for calculating a remaining capacity as a capacity of electricity dischargeable by a secondary battery. The device comprising: voltage measuring means for measuring an output voltage value of said secondary battery; and arithmetic means for performing information processing, a reference voltage curve as a discharge characteristic of said secondary battery being recorded in said arithmetic means; said *arithmetic means divides a use mode of said secondary battery into a high consumption mode* in which the *output voltage value* is not lower than a threshold value and a *low consumption mode* in which the *output voltage value* is lower than the threshold value, said arithmetic means calculates a remaining capacity of said secondary battery in said low consumption mode on a basis of the voltage value measured by said voltage measuring means and said reference voltage curve, and said arithmetic means calculates a remaining capacity in said high consumption mode *on a basis of a reference remaining capacity as a remaining capacity before a use mode change,* a start voltage as an output voltage at a time of a start of the high consumption mode, a predetermined cutoff voltage of said secondary battery, and said output voltage value.

Independent claim 26 recites, at least in part a battery remaining capacity calculating device for calculating a remaining capacity as a capacity of electricity dischargeable by a secondary battery. The device includes: voltage measuring means for measuring an output voltage value of said secondary battery; and arithmetic means for performing information processing, a reference voltage curve as a discharge characteristic of said secondary battery being recorded in said arithmetic means; wherein *said arithmetic means divides a use mode of said secondary battery into a high consumption mode* in which the *output voltage value* is not lower than a threshold value and a *low consumption mode* in which the *output voltage value* is lower than the threshold value, said arithmetic means calculates a remaining capacity of said secondary battery in said low consumption mode on a basis of the voltage value measured by said voltage measuring means and said reference voltage curve, and said arithmetic means

calculates a remaining capacity in said high consumption mode on a *basis of a voltage gap as an output voltage change at a time of a use mode change* and said output voltage value.

Independent claim 28 recites, at least in part a battery remaining capacity calculating program for calculating a remaining capacity as a capacity of electricity dischargeable by a secondary battery. The program includes making a processor perform: a voltage measuring step of measuring an output voltage value of said secondary battery; *a mode determining step of dividing a use mode of said secondary battery into a high consumption mode* in which the *output voltage value* is not lower than a threshold value and a *low consumption mode* in which the *output voltage value* is lower than the threshold value; a low consumption time remaining capacity calculating step of calculating a remaining capacity in said low consumption mode on a basis of a predetermined reference voltage curve as a discharge characteristic of said secondary battery and said output voltage value; and a high consumption time remaining capacity calculating step of calculating a remaining capacity in said high consumption mode *supposing that there is little change in the remaining capacity at a time of change from said low consumption mode to said high consumption mode.*

Applicants respectfully submit that Shimoyama fails to disclose or suggest several elements of the independent claims, as discussed below.

Shimoyama generally relates to a battery remaining capacity measuring apparatus that applies a first correction factor to the remaining battery capacity estimation if *the temperature* of the battery is low, or applies a second correction factor if *the temperature* of the battery is high. (See, Shimoyama, Fig. 6 and Abstract). Shimoyama incorporates a temperature sensor 5 for determining whether to apply a low-temperature correction factor, or a high-temperature correction factor. Accordingly, if the temperature of the batter in Shimoyama is a normal range (i.e., not too high or low) no correction factor is applied. That is, in the normal temperature range, it is not necessary to apply any correction factor from equations (2), (3), (4) or (5). (See, Shimoyama, col. 5, lines 25-67).

The Office Action asserts that Shimoyama discloses dividing a use mode of a secondary battery in a high mode in which the <u>output voltage value</u> is not less than (i.e., greater than or equal to) a threshold value, and a low consumption mode in which the <u>output voltage value</u> is lower than the threshold value. (See, Office Action, pg. 3). The Office Action equates V_F in

Shimoyama with the claimed 'output voltage value.' On the contrary, V_F refers to a voltage associated with a fully charged battery. (See, Shimoyama, col. 6, lines 31-32). The Office Action also equates V_N with the claimed threshold value. (See, Office Action, pg. 3). On the contrary, V_N refers to an estimate of a current battery voltage calculated by the voltage estimation means 21 based on a current sample of voltage readings from the voltage sensor 9, and the voltage-current approximate linear function. (See, Shimoyama, Fig. 3 and col. 4, lines 26-37). The only arguable threshold in Shimoyama is a temperature threshold, not a voltage threshold that is associated with a use mode, as recited in the presently claimed invention. For example, Shimoyama discloses a *temperature discrimination means 27* (i.e., not a voltage discrimination means) to determine whether to calculate a low temperature pattern with the low temperature pattern calculation means 31, or to determine a high temperature pattern with the high temperature pattern calculation means 29. Specifically, Shimoyama discloses several sensors that gather information about a state of the battery 3. These sensors include a voltage sensor 9, a temperature sensor 5, and a current sensor 7. (See, Shimoyama, col. 4, lines 18-24). However, as mentioned above, the remaining capacity operation portion 19 does not determine a use state of the battery based on an output voltage, as recited in the present claims. Rather the voltage measurements are fed into the voltage estimate means 21, as indicated in Fig. 3. Fig. 3 illustrates that the measured voltage does not contribute to the determination of whether the battery is in a high temperature mode or a low temperature mode (i.e., the alleged use mode). That is, the voltage data bypasses the temperature determination means 27 and the pattern calculation means 29,31.

The Office Action appears to allege that Shimoyama discloses dividing a use mode of a secondary battery based on an output voltage value because "dividing a use of mode (which depends on the temperature, since the battery voltage is proportional to the temperature..." While Shimoyama does disclose that "a battery voltage is inclined to decrease as a temperature drops" and that "when a temperature is high, a battery voltage is inclined to get higher," it does not disclose using an output voltage to divide the use mode of the batter. (See, Shimoyama, col. 1, lines 52-53 and col. 2, lines 1-2). Rather, Shimoyama simply discloses providing a correction factor based on a temperature reading. As discussed above, as shown in Fig. 3, the voltage readings are not used in determining a low or high temperature state.

Moreover, it is not clear that a high temperature reading corresponds to the claimed "high consumption mode" or that a low temperature reading corresponds to a the claimed "low consumption mode." Shimoyama does not appear to disclose that there are multiple battery capacity <u>use consumption levels</u> or modes of the battery corresponding the rate at which battery is consumed, much less detecting these different use modes based on a voltage measurement, as recited in the presently claimed invention. In the present Specification, an example of a high consumption mode is when a portable telephone is in call mode (i.e., this requires a higher rate of power consumption from the battery). An example of a low consumption mode is when the portable telephone is in standby mode (i.e., this requires a lower rate of power consumption from the battery). As explained with reference to Figs. 2 and 4 of the present application, the relationship between the discharged capacity when the battery is in a low consumption mode (e.g., standby mode) and output voltage is different that when the battery in a high consumption mode (e.g., talk mode). However, due to the increased internal impedance of the battery when the battery switches from low consumption mode to high consumption mode, the output voltage decreases, as shown by the discontinuous voltage change in Fig. 4. (See also, [0055]). According to the presently claimed invention, when this change of use mode from low consumption to high consumption occurs (as is accompanied by the discontinuous drop in voltage due the increase in internal impedance), even though the voltage sharply drops, the arithmetic means calculates the remaining capacity assuming that the remaining capacity is the same as immediately before the change to a high use state.

Applicants also note that in the second paragraph of page 2 of the Office Action, the Examiner refers to a high consumption mode of the battery as a state when the battery has a fully charged voltage V_F. However, in the preceding paragraph, the Examiner refers to the "low consumption mode (which corresponds to the maximum voltage V_F)." Applicants also respectfully request clarification as to how a fully charged battery voltage corresponds to a high (or low) consumption mode. For example, in an example of the presently claimed invention, the battery of a cellular telephone can be fully charged and can operate in either of the high consumption mode (i.e., call mode) or the low consumption mode (i.e., standby mode).

For at lcast the reasons discussed above, Applicants submit that Shimoyama fails to disclose or suggest each of the elements of independent claims 16, 24, 26, 28, and dependents thereof.

Accordingly, Applicants respectfully request the withdrawal of the anticipation and obviousness rejections of claims 16-30 based on Shimoyama.

For the foregoing reasons, Applicant respectfully submits that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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